

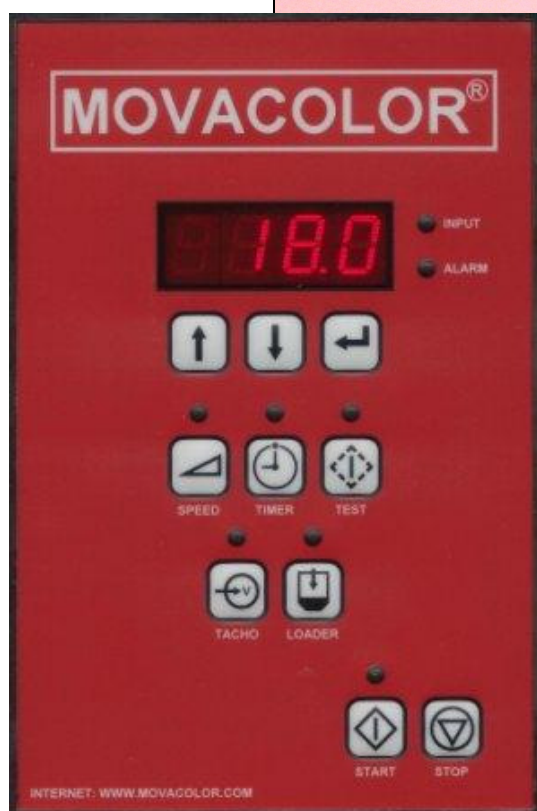
# MOVACOLOR

COLOR IN CONTROL

## MC18-Micro

### User manual 1.08.UK.00

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Manual Revision : 00  
Datum : June 2011

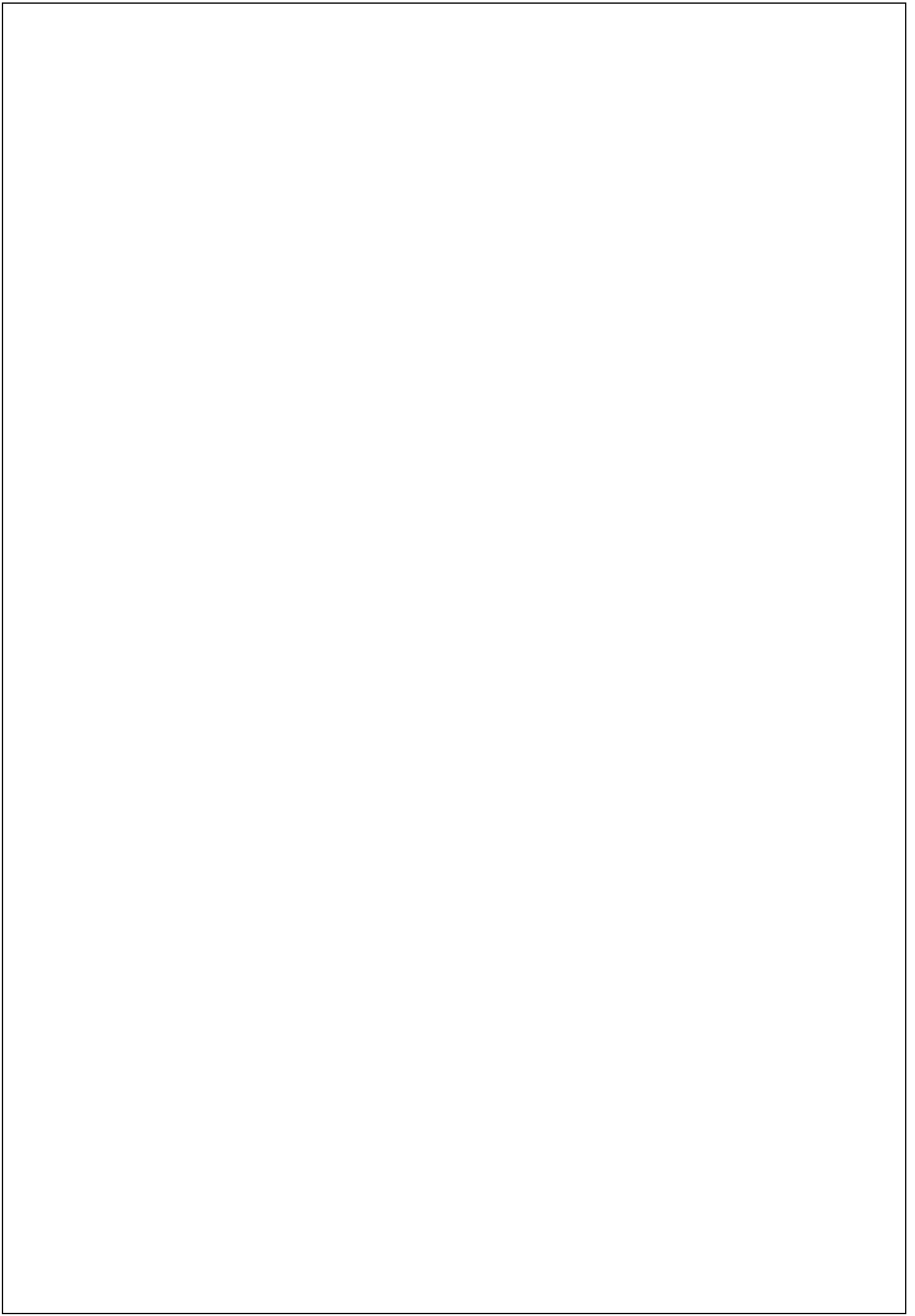


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# 1. Introduction

Thank you for purchasing a Movacolor metering device. This manual is addressed to operators and **qualified technicians** taking care of the metering of dry additives to ensure correct use of the Movacolor dosing unit.

① IMPORTANT NOTE: THIS MANUAL MUST BE READ BEFORE INSTALLING THE DOSING UNIT. KEEP THIS MANUAL IN A PLACE ACCESSIBLE FOR ALL OPERATORS.

## 1.1 Symbols

① Important note



Attention; safety regulations for the operator

## 1.2 Terms

**Operator:** A person charged to operate, adjust, maintain and clean the machine.

**Qualified Technician:** A specialized, suitable trained person authorized to execute the installation, non-routine maintenance, or repairs requiring special knowledge of the machine and how it operates.

## 2. General information

### 2.1 Safety



The equipment is only designed and may only be used for the dosing of dry additives. Any use that does not conform to the instructions is considered improper and as such releases the manufacturer from any liability in regard to damage to things and/or persons.



Before switching on the unit for the first time, ensure that the mains power voltage applied is between 80 and 260Vac.



Always switch off the Movacolor control cabinet and disconnect the mains power plug from electrical power before performing maintenance.



Ensure that all parts are securely fixed to the extruder or injection molding machine.



Dangerous voltages are present inside the control cabinet for up to 2 minutes after it has been switched off.

### 2.2 Certification

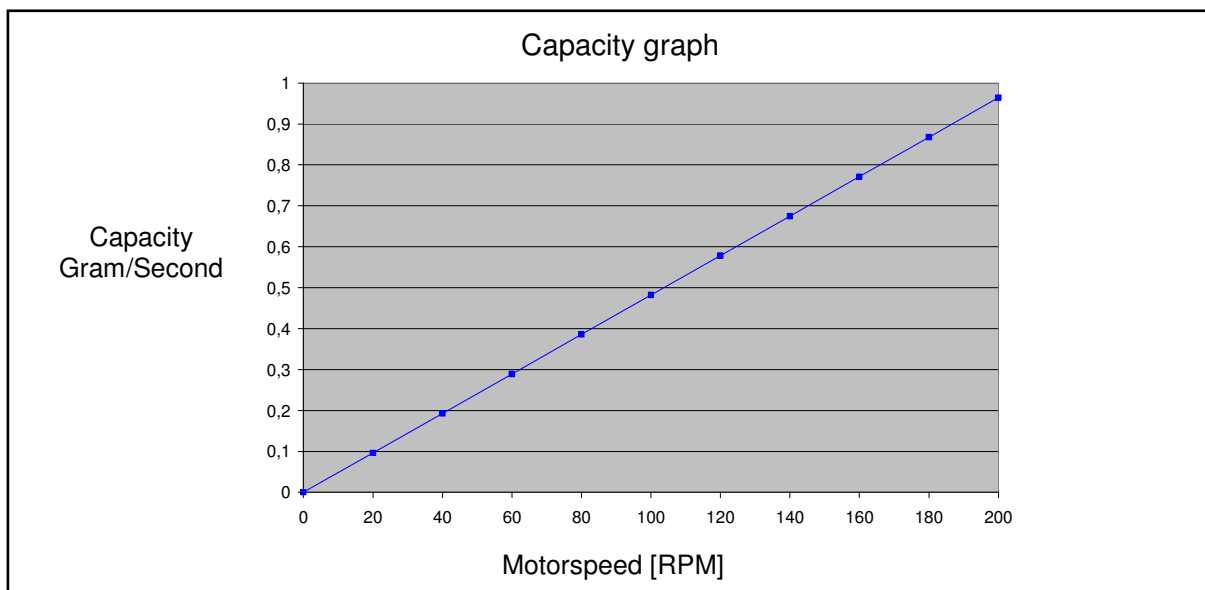
The Movacolor dosing unit is designed and produced in conformity with the following European regulations:

- CEE standards for machinery (health, safety, environment)
- EMC (electromagnetic compatibility)
- VEM (safety electric material)
- 98/37/EC, Annex 1 (See the declaration of conformity, Appendix E)

### 2.3 Operating environmental conditions

- The unit must be protected against weather conditions
- Operating temperature -20 to +70 degr. C.
- Protection class: IP-50

### 3. Capacities



Note \* measured with normal granular masterbatch 0,8 kg/dm<sup>3</sup>.

Note \*\* measured with free flowing powder 0,65 kg/dm<sup>3</sup>.

Note \*\*\* only available with high torque (4,5 Amp) stepper motor

The actual capacity of the dosing system depends on:

The volume weight of the material (bulk density)

The specific weight of the material (specific density)

The granular shape of the material

The granule size

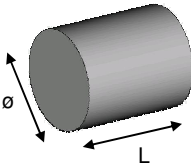
The surface structure of the material

Granular material can be normal or micro. The granular material and powder material has to be free flowing, non-static and not sticky.

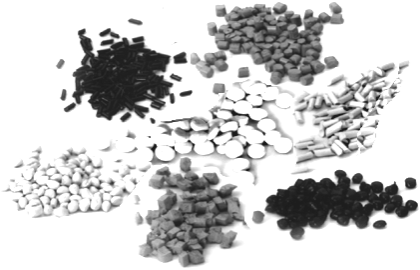
To determine the kind of material in your application use the description below.

**Material types**

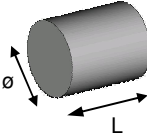
**Normal Granules:  
(NG)**



$\varnothing < 4 \text{ mm}$      $L < 4 \text{ mm}^*$



**Micro / Mini Granules:  
(MG)**



$\varnothing < \varnothing 2,5 \text{ mm}$      $L < 3 \text{ mm}^*$



The term Micro/Mini Granules also includes free flowing powder.

## 4. Installation

### 4.1 Transport

To protect the Movacolor unit against damage during transport, the unit is packed in a cardboard box filled with polyurethane foam. Delivery terms are Ex-Works Sneek, The Netherlands. Buyer is responsible for the transport. Movacolor cannot be held liable for any damage during transport.

### 4.2 Receipt

Check the unit thoroughly upon receipt. Pass any remarks to the local agent or Movacolor within 8 days upon receipt of goods.

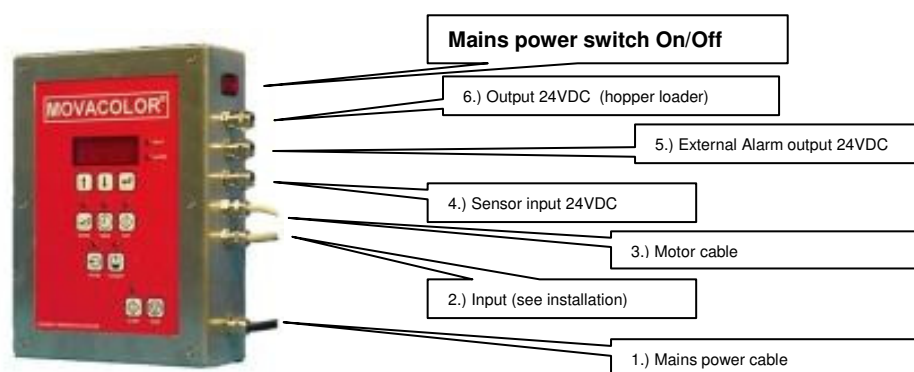
### 4.3 Electrical installation.

The MC-18 controller is standard equipped with 3 connections:

1. Mains power cable,  
① Before switching on the unit for the first time, ensure the mains power voltage being applied is between 80 and 260Vac.
2. Input cable
3. Motor cable

Optional are:

4. Sensor, complete with cable
5. Alarm flash light, complete with cable
6. Compressed air solenoid valve complete with cable (for automatic hopper loader)



See appendix A  
for wiring diagram

#### Input (start) signal

The MC-18 needs an input signal from the production machine in order to operate. Three different input signals can be used to control the MC-18.

#### **1.) A potential free relay contact.**

Use the white and brown wire for the potential free contact.

#### **2.) A relay signal up to 24 Volt DC\*.**

In case of a powered relay signal connect the white wire to +24 VDC and the yellow wire to - side.

\* Note potential contact

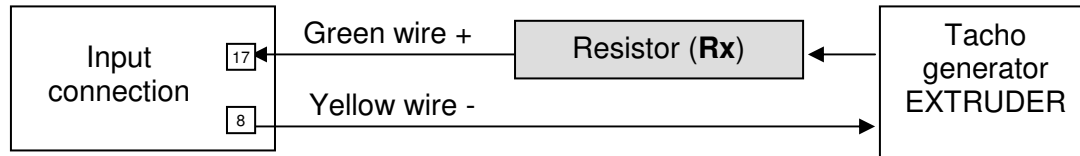
Guaranteed OFF: 0-8VDC

Guaranteed ON: 18-30VDC

#### **3.) A tacho signal up to 30 Volt DC.**

This is used when the MC-18 needs to be connected to an extruder that has a generator that produces a voltage linear to the extruder speed. When using a Tacho generator signal, connect the white and brown wire, connect green to + VDC and yellow to - side of the generator. See Paragraph 6.6 for information about the configuration of the tacho parameters.

The maximum voltage that can be applied to the MC-18 is 30 VDC. The tacho voltage has to be reduced to 30 VDC if the tacho generator has a higher voltage output than 30 VDC at the maximum extruder output capacity. See the diagram below.



$$R_x \text{ (kilo-Ohm)} = (2,684 \times (\text{Max. tacho output VDC} - 5)) - 66$$

## 5. Installation hopper loader (optional)

### 5.1 Mechanical installation

The Hopper loader lid fits directly on the hopper of the dosing unit.  
To fix the ME hopper lid the quick release clamps on the dosing hopper are used.

### 5.2 Compressed air installation

The ME-loader uses compressed air to move material. The inlet for your compressed air supply line is on the solenoid valve. The air connection diagram can be found on the valve's body.

1. Connect the compressed air to the  $\varnothing 8 \times 6$  compressed air connection on the solenoid valve  
The compressed air source must deliver a maximum of 4-8 bar of clean, dry (non-lubricated), air pressure.
- 2 . Make connections from the solenoid and the ejector pipe with the provided compressed air tubing. Quick disconnect fittings are provided for these connections. The tubing should be cut to length for maximum efficiency of the system. Use straight cuts to assure a good square tubing end. Confirm a good connection.



#### CAUTION:

Be sure to provide hazard-free routing of the tubing, to keep it away from hot or moving surfaces and out of the way of personnel.

### 5.3 Connecting material line

The flexible hose need to be attached over the inlet pipe of the ME-hopper lid and ejector pipe.  
Secure the hose with a hose clamp.

Reduce flex hose down to the shortest possible length, to avoid wasting compressed air energy.



① IMPORTANT: The material line should be as straight as possible.  
Avoid loops and S-curves in flexible hose This can hurt conveying performance.

## 5.4 Adjusting compressed air flow

### Adjusting compressed air flow

It is advised to use a flow regulator for the compressed air (not included).

The air flow will determine how much material will be transferred and how fast the dosing unit will be replenished with material, with each loading sequence.

The best is to adjust the air setting to its lowest possible level in order to conserve compressed air energy. Parameters such as distance, material line bends, the flow characteristics of the material and vertical rises in the flex hose all play a part in finding the proper setting. Ultimately, trial and error settings over several loading sequences will work best to determine the right air level. Too low of a setting may not move material effectively enough to satisfy demands cycle after cycle. Too much air will waste energy and cause the filter on the lid to prematurely blind in an attempt to evacuate excess air.

## 5.5 Sensor adjustments

### Sensor

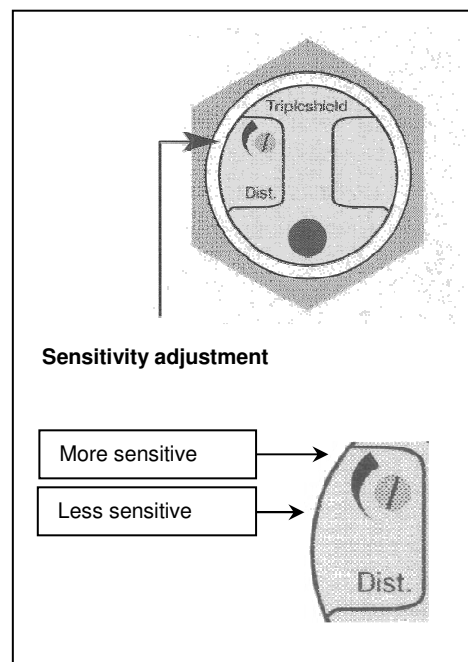
Depending on the material you may need to adjust the sensitivity of the sensor which is delivered with the hopper loader. At the back of the sensor is a small screw that can be used to adjust its sensitivity. To adjust, fill the hopper with material until the sensor is just covered and turn the screw until the light on the sensor goes on.

Because the sensor is in direct contact with the material, it is recommended that the sensor will be initially adjusted for sensitivity and then re-adjusted, once the sensor becomes coated with typical material fines, common to plastics conveying.

### Capacitive Sensor Adjustment

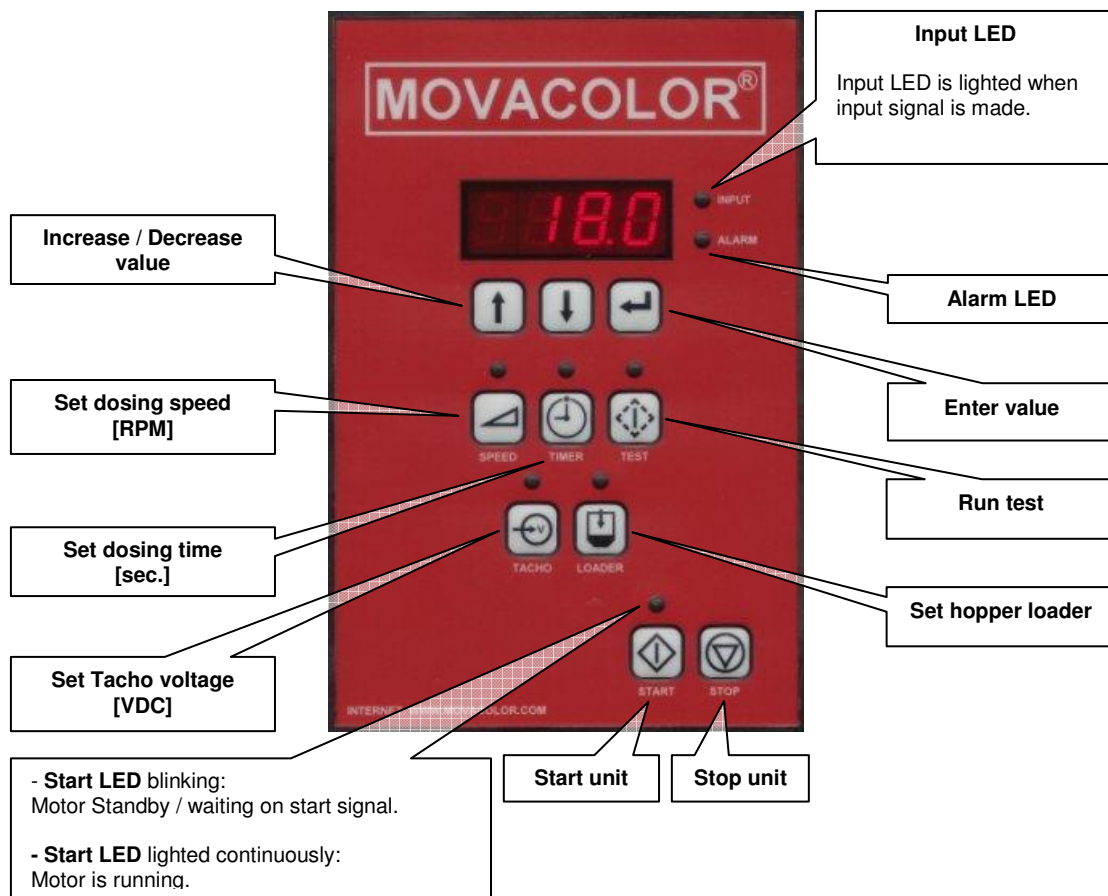
-The LED is ON  
when material is detected by the sensor.

-The LED is OFF  
when no material is detected by the sensor.



## 6. Operation

### 6.1 The Interface



### 6.2 General

- Connect motor before switching on the controller
- All changes (↑ ↓) have to be entered (→) to acknowledge.
- A blinking value means the changed data is not entered.
- To cancel a changed value, press the specific function button (SPEED or TIMER) again.
- Most functions have a designated key and a LED on the interface. When a function is activated the LED of that key/function will light up.
- All functions except the test (TEST) function can be activated when the unit is started. (depending on the chosen configuration.)
- Only one of the following functions (SPEED, TIMER), can be active at the same time. This means no other function can be activated before the active function is deactivated

❗ The unit can be set to different configurations, see paragraph 6.4

## 6.3 Start up

The MC-18 software version is displayed shortly when the unit is switched on, followed by the selected motor type Lo=Low Torque and HI=High Torque motor. After that the configuration mode (CON) will be shown.

| Configuration | Type of Production | Input signal | Hopper loader               |
|---------------|--------------------|--------------|-----------------------------|
| 1             | Injection Molding  | Timer        | none or ME (when connected) |
| 2             | Injection Molding  | Timer        | none or MV (when connected) |
| 3             | Extrusion          | Relay        | none or ME (when connected) |
| 4             | Extrusion          | Tacho        | none or ME (when connected) |
| 5             | Extrusion          | Relay        | none or MV (when connected) |
| 6             | Extrusion          | Tacho        | none or MV (when connected) |

When the MC-18 is set to configuration 3 to 6, the time function key  is deactivated. When a deactivated key is pushed the unit will give a beeping signal.

## 6.4 Configuration

**For changing the unit configuration,**

**keep speed  and enter  pressed while switching on the main power.**

The configuration number will be displayed, press   to switch between the possible configurations and press  to acknowledge. The software version will be displayed.

Configuration data is normally entered once and it remains the same for subsequent operation. The data entered during configuration is saved in memory and remains in the memory even when the unit is shut off or unplugged.

Timer 

Timer mode is used for injection molding with a relay input signal. When the relay contact is made, the unit will start dosing according the number of seconds that has been set with the time function.

Relay

A relay signal can be used when working in extruder mode. With the relay input the unit will start dosing when the relay contact is made and will stop when the relay contact is interrupted.

## 6.5 Speed and timer

Speed and dosing time can be altered (time only in case of injection molding)

Speed  = rotation of dosing system in RPM, (0,1 to 200 RPM)

Timer  = time dosing system will rotate after start impulse, at input cable ( 0,1 to 999,9 sec)

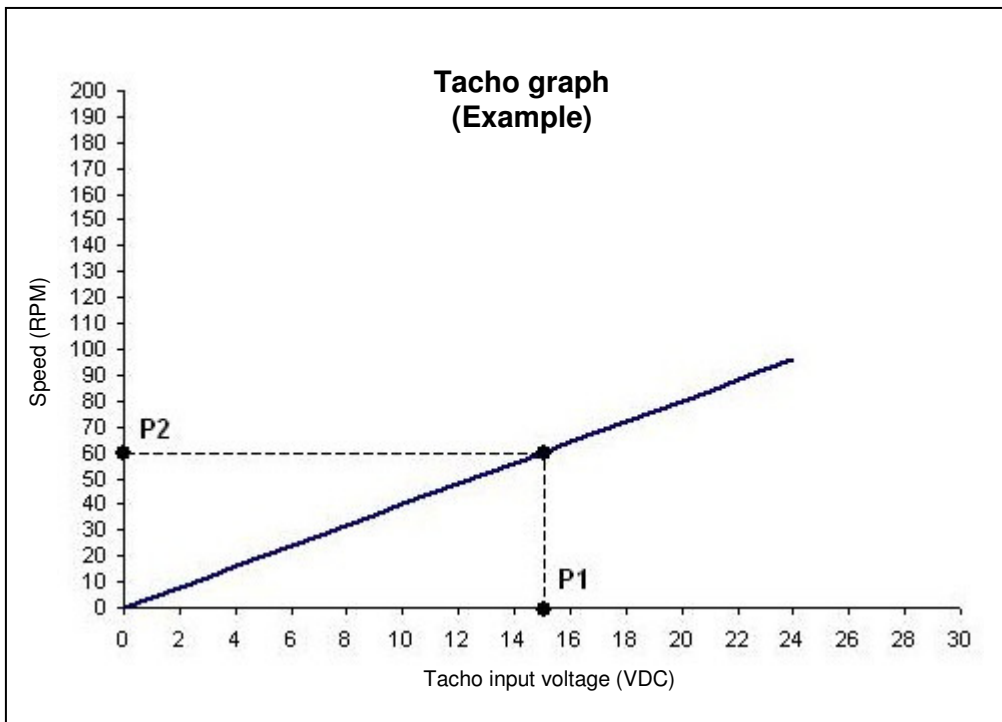
Activate by pressing  or  , set the desired speed or time using   press enter  to acknowledge

## 6.6 Tacho function

The tacho function is available in configuration 4 & 6.

This function can be used with extrusion when it is necessary that the dosing rate is automatically adjusted to the extruder speed. In tacho mode an input voltage is coupled to a dosing speed setting. If the extruder speed changes, the tacho input voltage and speed of the dosing unit will change accordingly.

A linear correlation between extruder speed (tacho input signal) and the needed dosing speed is assumed. See graph.



Press  to make the tacho function active. The display will show a numerical value that represents the current voltage of the tacho input signal. When  is pressed the current voltage (P1 in the graph) is coupled to the set speed (P2 in the graph).

During production, the speed (P2) can be changed. The new speed is coupled to the previous stored voltage and the graph will change accordingly.

During production, the voltage (P1) can be adjusted to the current tacho input voltage by pressing  followed by . The new voltage is coupled to the previous stored speed and the graph will change accordingly.

The maximum voltage that can be applied to the MC-18 is 30 VDC. See paragraph 6.4 for information about the correct electrical connections of the tacho signal and information about connecting a higher than 30 Volt DC input signal.

## 6.7 Production (Motor On/Off)

Press  to start production. The start LED will start blinking when the unit is waiting for an input signal. The unit is dosing if the start LED is lighted continuously.

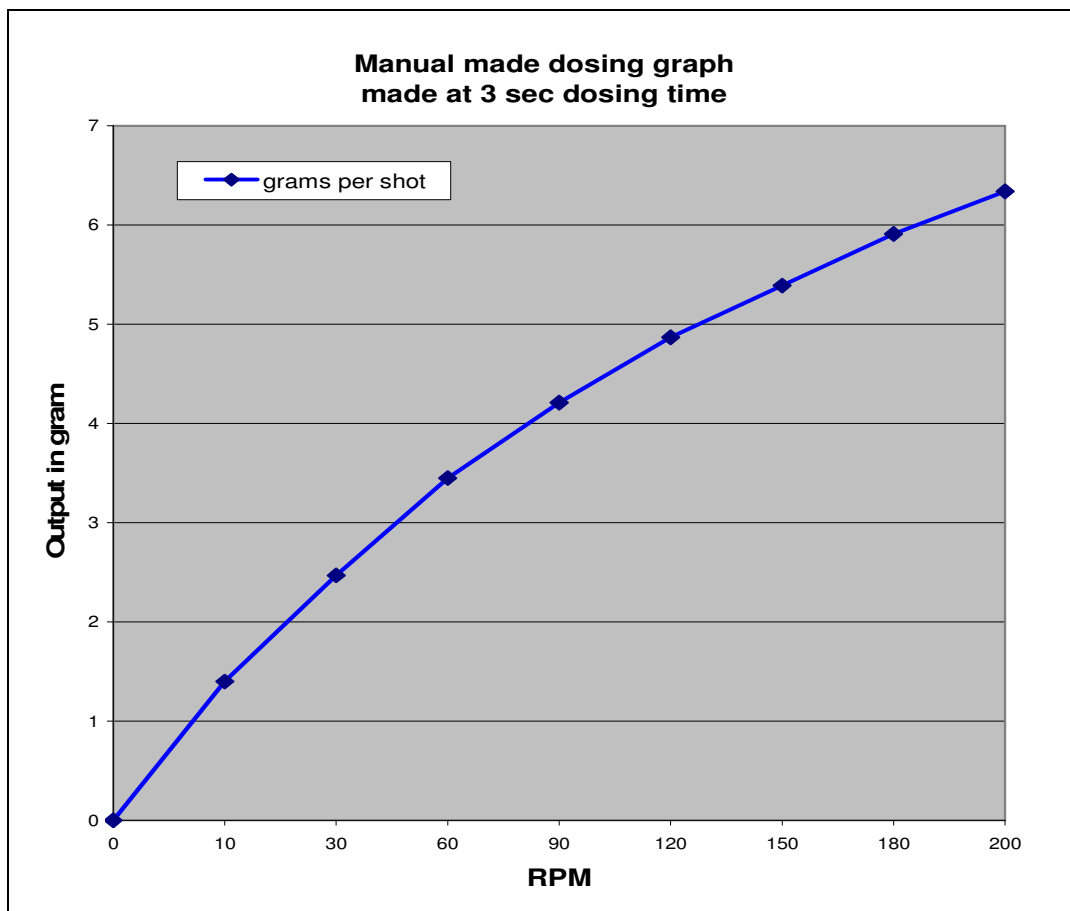
## 6.8 Test (material output)

The test function is used to calibrate the MC-18

The test function can only be used when the motor is stopped .

### How it works

Determine the dosing unit RPM entirely manual. This can be done by drawing up the dosing characteristic manually, or by recording the relation of the RPM versus the system output in a chart. With this multipoint chart, it is possible to determine the rpm that corresponds to the dose amount. This must be repeated for every dosing setting because the dosing conditions and the used materials are usually very different.



Test procedure to determine output of dosing system:

Place dosing unit horizontally leveled (water level surface).

→ Set the speed (and or) time

→ Press  for Test

→ Weigh the material dosed during test

→ Adjust speed or time and repeat  Test if necessary.

### Note:

(Configuration 1 & 2 / Injection Molding): The unit will dose at the set speed  and time .

(Configuration 3 to 6 / Extrusion): The unit will dose for 30 seconds at the set speed .

ⓘ Emergency stop.

If the test is activated press stop  to cancel a test.

## 6.9 Automatic hopper loaders (optional)

### Hopper loader settings

---

This part of the manual describes how to make the hopper loader settings. For further technical information about the hopper loader consult the specific hopper loader manual.

#### General

① The hopper loader is only activated when the motor is On .

① Emergency stop.

To stop the hopper loader during production press , select "Off" by pressing  or  and press  to acknowledge.

#### Input signal (sensor)

Depending on the material you may need to adjust the sensitivity of the sensor which is delivered with the hopper loader. At the back of the sensor is a small screw that can be used to adjust its sensitivity. To adjust, fill the hopper with material and turn the screw until the light on the sensor goes on.

#### Output signals

During fill time [FILt] there will be a 24VDC signal between connection 20 and 21 on the main board to activate the pneumatic solenoid valve (See appendix A)

The hopper loader LED on the front of the controller indicates the status of the valve output.

When the Fill Alarm [FILA] is active there will be a 24VDC signal between connection 18 and 19 on the main board to activate the flash light. (See appendix A).

The controller itself gives a beeping signal and the alarm LED will lighten up.

### ME settings

Configuration 1, 3 and 4 (see paragraph 6.3 & 6.4)

---

Press  to change ME hopper loader settings, the display will show in following order:

- On / Off: Press   to switch the ME-hopper loader On or Off and press  to acknowledge.
- FILt: Fill time [sec.], during this time the system blows material into the hopper of the dosing unit.  
Press   to change the time and press  to acknowledge.  
Recommended basic setting: 15 sec
- FILA: Fill Alarm [sec.], if sensor is NOT covered within this time, the alarm starts.  
Press   to change the time and press  to acknowledge.  
Recommended basic setting: 30 sec

## **6.10 Keyboard lock**

 +  +  = Lock / Unlock,

Display shows : L.ON / L.OFF

## 7. Alarms

### 7.1 General

To cancel an alarm press enter .

When an alarm is active there will be a 24VDC signal between connection 18 and 19 on the main board to activate the flash light. (See appendix A).

The controller itself gives a beeping signal and the alarm LED will lighten up.

### 7.2 Filling alarm [FILA] (optional)

The MC-18 is able to give an alarm when there is not sufficient material inside the hopper.

#### Alarm settings when using a automatic hopper loader.

See paragraph 6.9

#### Alarm settings manual hopper filling (without automatic hopper loader)

In case of manual filling of the hopper, the hopper loader control of the MC-18 is used to generate the filling alarm. A sensor and an alarm output is needed.

Use the settings below.

ME: ME hopper loader = ON  
FILt = 0,1  
FILA = 0,2

The Filling alarm is self eliminating,  
this means that the alarm will stop automatically when the sensor is covered with material.

If an alarm is canceled by pressing enter  the next alarm will come (if the sensor is still not covered) with a delay of 60 seconds. This gives the operator the time to manual fill the hopper without having the alarm on.

### 7.3 Motor connection failure [Err0]

Err0 : Motor connection failure.

Make sure the motor is connected

Check cable and connectors for damage.

Press enter  to stop the alarm.

*When the MC-Micro unit is supplied excluding dosing unit (only hopperloader, no dosing motor) [Err0] is disabled (Jumper 1 "JP1" on the Mainboard is placed in the "OFF" position.)*

*This jumper is located on at the upper right side of the Mainboard. To activate the motor alarm [Err0], jumper 1 must be placed in the ON position.*

## 8. System performance

The following variables may influence the accuracy and repeatability of the system:

1. Material properties. Easy flowing, non-sticky and non-static material that comes in the form of small regular shaped granules or powder can be dosed very accurate and regular.
2. Periodical cleaning of the dosing cylinder and seals is necessary for proper operation.
3. Extreme vibrations and shocks can have negative influence on system performance.
4. An unstable relay signal has a negative influence on the repeatability.
5. With injection molding the shot to shot accuracy depends, besides the variables mentioned so far, on the shot time in combination with granule size and weight. If relatively big and heavy granules have to be dosed in a very short time, it will influence the shot accuracy and repeatability, because if only a few granules are dosed during the shot, one granule more or less makes a big difference on the total shot weight.
6. Vacuum or overpressure in the neckpiece caused by driers or hopper loaders.
7. Bridging or rat holing of the material inside the hopper can happen if the material is not free flowing.
8. Bridging or rat holing of the material inside the hopper can happen if the material is extremely static.
9. Extremely static material can contaminate the dosing cylinder.
10. In case of water cooled neckpiece, check if there is material build up around the dosing cylinder and the water cooled pipe. Check also the water supply to the neckpiece.

## **9. Maintenance (hopper loaders)**

### ***9.1 Preventative maintenance schedule***

- **Daily**

Clean the conveying filter.

If you are running a dusty material or regrind you may need to check and clean the filter more often. The filter should be cleaned whenever you change materials.

## 10. Troubleshooting hopper loaders

### 10.1 Conveying problems and solutions.



#### **WARNING:**

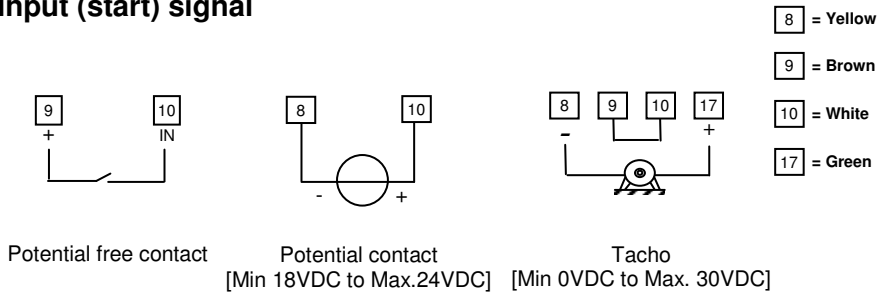
#### **Disconnect power and air sources.**

Always disconnect the loader from its main power source and compressed air source before servicing. This prevents the loader from starting during servicing, which could cause personal injury.

| Problem                         | Possible cause                             | Solution                                                                                                                                                                                              |
|---------------------------------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Low or no material flow.</b> | Does the filter need to be cleaned?        | Check the filter, if it is clogged with dust or fines, clean the filter.                                                                                                                              |
|                                 | Are there kinks in the flex hose?          | Check the material flex hose line for loops and "S" curves. Remove any loops and "S" curves in the flex hose. Try to keep the hose as straight as possible. Check the material line for holes, cracks |
|                                 | Are hose connections too loose?            | Check the material line hose connections for leaks especially at the ejector pipe connection. Hose clamps should be used.                                                                             |
|                                 | Are compressed air adjustments correct?    | Check the compressed air adjustment to make sure it is properly adjusted for optimum flow. Too much air will prematurely blind the filter; too little air will create clogs.                          |
|                                 | Do you have enough material at the source? | Replace/refill the material container                                                                                                                                                                 |
|                                 | Has material plugged the flexible hose?    | Check the material flex hose line for loops and "S" curves. Remove any loops and "S" curves in the flex hose. Try to keep the hose as straight as possible.                                           |
|                                 | Is the compressed air tubing connected?    | Assure that the ejector pipe (s) are supplied with compressed air via the supplied tubing.                                                                                                            |
| <b>Loader will not cycle.</b>   | Are all electrical connections correct?    | Check to make the sensor is connected to the control and the solenoid is connected to the control.                                                                                                    |
| <b>Filter clogs frequently.</b> | Is there too much compressed air flow?     | Adjust the air flow to minimum possible level to prevent excessive dusting and filter clogging.                                                                                                       |

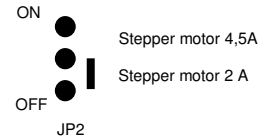
# APPENDIX A: MC-18 Wiring Diagram

## Input (start) signal

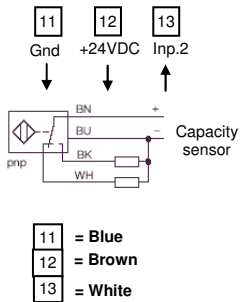


## Jumper settings

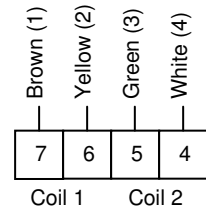
To switch from stepper motor 2A to stepper motor 4,5A



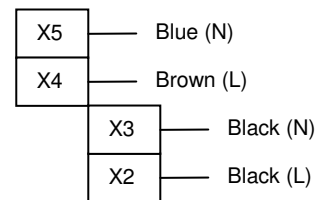
## Sensor input (24VDC) INP2



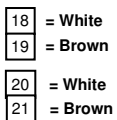
## Motor



## Internal wires main power switch



## Outputs [ 24 VDC]

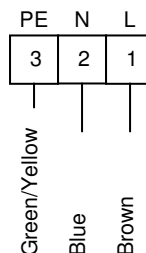


## Power Supply

Western Europe

USA, Canada, Mexico,

Mid America, Japan, Taiwan



1 = Black  
2 = White  
3 = Green

① To open the control cabinet use the 4 bolts on the top and bottom side, not the 6 bolts at the front side.

① **WARNING**  
Do not make any changes to the main board/components or warranty will lapse.



# APPENDIX B: MC18-Micro Technical Specifications

## Controls:

Speed: Manual setting from 0,1 to 200 RPM max, in increments of 0,1 RPM.  
Time: Manual settings from 0,1 to 999,9 sec in increments of 0,1 sec.  
Voltage settings of tacho-voltage: auto-detect  
Integrated hopper loader controller

## Monitoring/System Information/External communication

4-piece 7 segments LED at front display.

Man/Machine interface: keypad

External Communication: none

Alarm: LED Indication + Internal beeper, 1x external alarm output.

## Specifications/Standards & Directives/ Technical data:

Power supply: Operating power from 80 VAC to 260 VAC, 50 and 60 Hz  
by integrated automatic voltage selector

Power consumption: 80 Watt maximum

Stepper motor: (1,8degr/step) max 2 Amp at 40 Volt.

Operating Temperature: -20 to +70 degr. C.

## Input signal(s):

Injection molding: Start/Stop trigger input, potential free or 18-24VDC\*  
Input for level sensor.

Extrusion: Start/Stop trigger input, potential free or 18-24VDC\*  
Tacho input 0..30VDC  
Input for level sensor.

\* Note potential contact

Guaranteed OFF: 0-8VDC

Guaranteed ON: 18-30VDC

## Output(s):

-Stepper motor max. output 2A (40VDC)

-Solid state 24VDC/0.5 A output for valve hopper loader

-Solid state 24VDC/0.5 A output for external alarm

-Maximum total output power: 12 Watt (Valve output + alarm output)

## Standard Directives:

Protection class: IP-50

According to CE standards:

EN50081-2 (HF radiation industry)

EN50082-2 (HF immunity industry)

## Safety

- In case of overload due to short-circuit or in correct connection, the power supply automatically shuts down.
- Opto insulated start input for connection to production machine.

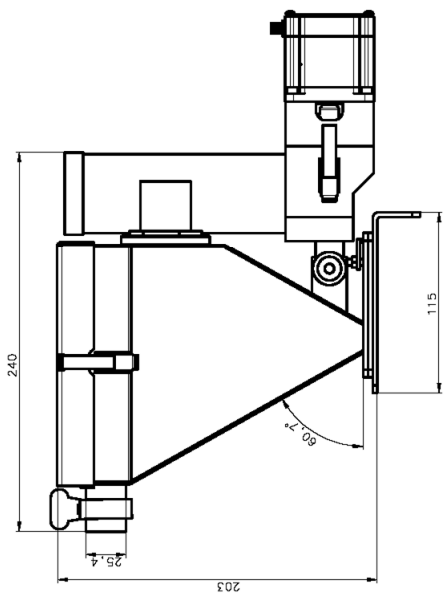
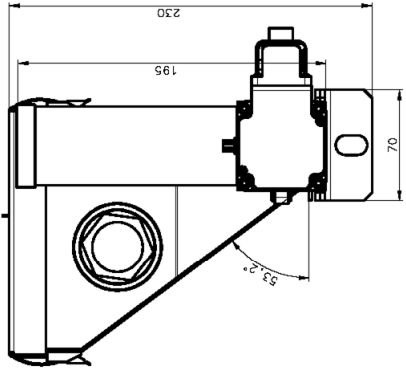
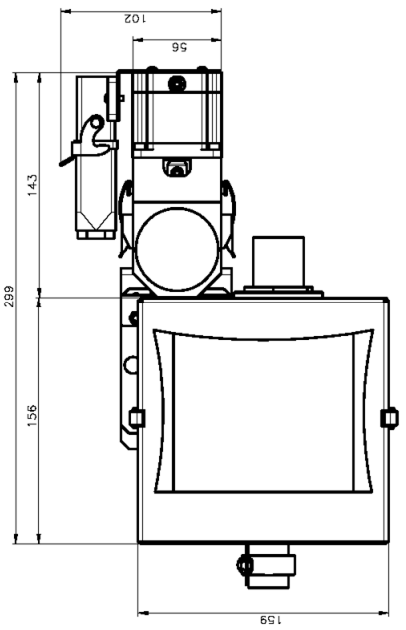
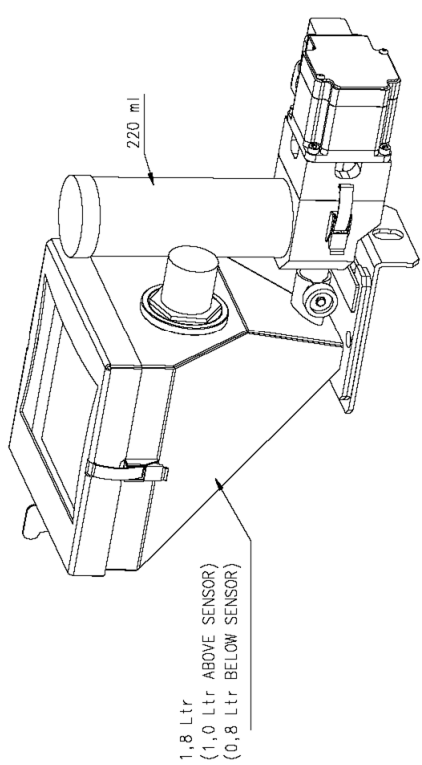
## Optional parts

- External Alarm Flash light.
- External Alarm Siren.

## APPENDIX C: MC18-Micro Technical Specifications Hopper loaders

|                                                                                                                                                                                                                             |                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>Loader model</b>                                                                                                                                                                                                         | <b>ME25</b> (For normal granules and small regrind)                                   |
| Maximum capacity* with 1,8 ltr hopper                                                                                                                                                                                       | 15 kg/h ( based on 10 seconds ON time and 3 minutes OFF time)                         |
| Maximum Capacity* (value mentioned only for reference)                                                                                                                                                                      | 175 kg/h (at continuous working)                                                      |
| Standard conveying distance                                                                                                                                                                                                 | 3 mtr                                                                                 |
| Material hose                                                                                                                                                                                                               | Ø25mm (inside diameter)<br>PVC hose with antistatic wire.<br>Maximum temperature 60°C |
| Compressed air hose                                                                                                                                                                                                         | Ø6x1mm, outside ø8mm                                                                  |
| Compressed air requirements                                                                                                                                                                                                 | 4 to 8bar                                                                             |
| Consumption                                                                                                                                                                                                                 | 0,25 to 0,45 m <sup>3</sup> /min.                                                     |
| Filter type                                                                                                                                                                                                                 | Stainless steel Perforated plate, hole size ø2mm.                                     |
| Additional Filter Cloth for fine dust.                                                                                                                                                                                      | Filter cloth 120x120x12mm, EN779 classification G4                                    |
| * The capacities are measured with normal granules with a bulk density of ~0,8 kg/dm <sup>3</sup> . Granule size 3-4 mm.<br>De mentioned capacities are orientation values because capacity depends on material properties. |                                                                                       |

# APPENDIX D: MC18-Micro Drawing General Dimensions



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| 100 | 2010 Mar 18 | P. S. |      |       |



Teil: 0031-(0)515-570020  
Fax: 0031-(0)515-570021

# APPENDIX E: MC18-Micro Declaration of Conformity

## DECLARATION OF CONFORMITY

(According to 98/37/EC, Annex 1)

**Manufacturer's name** : **MOVACOLOR BV**

**Address** : **P.O. Box 3016  
8600 DA Sneek  
The Netherlands**

**Declare under our sole responsibility that the product:**

**Name** : **Movacolor**

**Model** : **MC-18-Micro**

**Year** : **20.....**

**Serial nr.** : **.....**

- **Complies with the definition of the Machine Directive (98/37/EC), and complies with the national legislation to enforcement of this directive;**
- **complies with the requirements of:**
  - Low Voltage Directive (73/23/EEC)
  - EMC Directive (89/336/EEC)
- **complies with the following standards or other normative documents:**
  - NEN-EN 292-1/2 Safety of machinery part 1 + 2

(Signature)

**Place: Sneek the Netherlands**

**Managing Director**

**Date: June 16, 2011**



